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ABSTRACT

Rogers' protection motivation theory that, in a fear-producing situation, stresses cognitive processes rather than emotional ones and emphasizes coping with or avoiding aversive events rather than reducing unpleasant emotional states and Bandura's theory of self-efficacy, i.e., all processes of psychological change operate through the alteration of the individual's sense of mastery, are both consistent with an expectancy-value model. However, each theory appears to omit a key component of the other. When the two theories are combined, a comprehensive model emerges. To test this model's ability to influence and predict changes in behavioral intentions, a factorial experiment was designed to examine the preventive health behaviors of 153 college students. Results disclosed an interaction effect interpreted in terms of two decision-making strategies that individuals use when confronted with danger: precaution and hyperdefensiveness. The results also provided evidence for self-efficacy as a causal factor in behavior change; direct manipulation of self-efficacy expectancies produced corresponding changes in behavioral intentions. The findings provide strong support for the importance of self-efficacy expectancy as a fourth component of protection motivation theory. (Author/JAC)

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Protection Motivation and Self-Efficacy: Toward a General
Expectancy-Value Model of Attitude Change

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Protection Motivation and Self-Efficacy: Toward a General
Expectancy-Value Model of Attitude Change

In the midst of the continual development of new conceptualizations and models of human behavior, several essential ideas have withstood the test of time and have emerged with regularity in more than one area of psychology. Two such ideas or concepts are "expectancy" and "value", generally taken into consideration together under the rubric of expectancy-value theory, a family of models based on the premise that people tend to engage in behaviors that they believe will get them what they want. Expectancy-value theories developed in the fields of learning and motivation (Tolman, 1932) and social psychology (Lewin, 1938) and have been adopted and modified by a number of other theorists in learning and motivation (e.g., Bolles, 1972), social psychology (e.g., Atkinson, 1957; Edwards, 1954), industrial/organizational psychology (e.g., Vroom, 1964), and clinical psychology (e.g., Rotter, 1954). The differences among these theories are often subtle and at times merely semantic. Yet, each seeks to explain human behavior by appealing to the same basic assumptions concerning the value of goals or consequences and the expectations of achieving those goals through the performance of specific behaviors.

Two recent theories based on these same assumptions are Rogers' (1975) protection motivation theory of the effects of fear appeal communications on attitudes and Bandura's (1977) theory of self-efficacy and avoidance behaviors. Though from traditionally different areas of theory and research, social psychology and clinical psychology, the theories of Rogers (1975) and

Bandura (1977) have much in common. Despite differences in terminology and methodology, both theories are consistent with an expectancy-value model and share several key concepts. Each theory, however, appears to omit an important component that is included in the other, and as such each may be viewed as incomplete. Yet, if the two theories are combined, a model emerges that incorporates the essentials of protection motivation theory, self-efficacy theory, and expectancy-value theory into a more comprehensive model of persuasion and attitude change. The brief discussion to follow is a demonstration of how such an integration may be accomplished. The empirical research to be described was an investigation of the utility of this integration.

This experiment was also an attempt to help construct a "conceptual bridge" between social and clinical psychology, an effort that has been contributed to by others (e.g., Brehm, 1976) and continues to be cited as a worthwhile endeavor for social and clinical psychologists (e.g., Harvey & Weary, 1979). We strongly share the belief that there is as much value in trying to find similarities among ideas in various fields as there is in specialization and diversification. The present article is an attempt to link several ideas from both clinical and social psychology and provide some empirical justification for the maneuver.

Self-Efficacy Theory

Self-efficacy theory maintains that all processes of psychological change operate through the alteration of the individual's sense of mastery or efficacy (Bandura, 1977). According to this theory, psychological changes achieved through different methods and techniques can be explained and predicted by an evaluation of changes in the individual's expectations of self-

efficacy, his/her belief that he/she is or is not capable of performing a behavior or set of behaviors. Expectations of personal efficacy determine what behaviors will be initiated, how much effort will be expended in performance, and how long the individual will persist when met with difficulty or failure (Bandura, 1977). This theory maintains further that an expectancy held by a person concerning a behavior and outcome can be viewed as two independent expectancies: an outcome expectancy, the belief that a given behavior or set of behaviors will or will not lead to a given outcome; and a self-efficacy expectancy, the belief that the person is or is not capable of performing the requisite behavior. According to Bandura (1977), outcome expectancies will have little effect on decisions about behaviors if people do not believe themselves capable of performing the behavior in question.

For the clinical psychologist, the distinction between self-efficacy and outcome expectancies may be important in designing successful behavior change procedures. In psychotherapy, for example, a client may fail to carry out a "homework assignment" recommended by the therapist because the client either (a) does not believe the recommendation will have the effects predicted by the therapist or (b) does not believe that he is capable of correctly performing the behavior. Determining the reason for this performance failure can be crucial to the success of psychotherapy. For example, in a study involving the use of a technique frequently taught in assertiveness training programs, Maddux, Sherer, and Rogers (in press) found that providing specific information about both the difficulty of the technique (self-efficacy expectancy) and its likelihood of success if performed correctly (outcome expectancy) determined the extent to which participants intended to make use of the technique.

The work of Bandura and his associates (Bandura, 1977; Bandura, Adams, & Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980) and studies by numerous other clinical researchers (e.g., Condiotte and Lichtenstein, 1981; Fleming & Thornton, 1980; Keyser & Barling, 1981; Zeiss, Lewinsohn, & Munoz, 1979) have clearly established that changes in self-efficacy expectations and changes in behavior are positively correlated, suggesting that alterations in self-efficacy expectancy may mediate the observed behavioral changes. Correlational techniques, however, reveal little about the direction of casual influence. If experimentally induced expectancies can produce changes in behavioral intentions, as suggested by the results of Maddux et al., then a stronger case can be made for maintaining that expectations and other cognitive events mediate behavior change. Previous research on self-efficacy has been directed primarily toward producing behavioral changes and determining if concomitant changes in self-efficacy expectancies are evident. In contrast, the present experiment (as in Maddux et al., in press) attempted to directly modify expectations of self-efficacy and outcome through experimental manipulation and to determine subsequent changes in behavioral intentions. Though the relationship between intentions and behavior continues to be the subject of vigorous investigation, sufficient support can be found for the notion that intentions may be powerful predictors of behavior change (e.g., Ajzen & Fishbein, 1980; Bagozzi, 1981; Davidson & Jaccard, 1979; Fishbein & Ajzen, 1975; Jaccard, 1980; Pomazal & Jaccard, 1976; Saltzer, 1981; Zuckerman & Reis, 1978).

Though logically compelling, the notion of self-efficacy has received little attention in expectancy-value theory. Mitchell (1974), for example, reviewed expectancy-value models of job satisfaction, occupational preference,

and work effort, one of the richest areas of expectancy-value theory and research. Of the theories he reviewed, none deals directly with an individual's expectation of successfully performing a behavior seen as leading to a desired goal. One of the major conclusions made by Mitchell (1974) concerning expectancy-value theory and research was that "limitations on the individual's ability to carry out intentions" (p. 1074) will limit the strength of the relationship between expectancies, values, and behaviors. By proposing that an expectancy is not a unidimensional phenomenon but is composed of two independent expectancies, one dealing with performance and the other with outcome, self-efficacy theory helps to refine the expectancy-value framework. Self-efficacy theory, however, does not deal directly with the value of a behavior and its consequences in predicting behavior change. The changes studied in most self-efficacy research (e.g., elimination of "neurotic" avoidance behaviors) are assumed to be valued by the participants since they presumably lead to more adaptive and effective coping skills. Saltzer (1981) found that the value placed on weight loss was an important determinant of the relationship between intentions to lose weight and actual weight loss for participants in a clinical weight loss program. Saltzer (1981) also found that perceptions of internal locus of control were important to the intentions-behavior relationship. Since internal locus of control can be seen as related to expectations of self-efficacy, Saltzer's results suggest that outcome value may be a useful component in self-efficacy theory.

Protection Motivation Theory

A fear appeal communication attempts to influence or persuade through the arousal of emotional tension or by the threat of impending harm (Higbee, 1969; Rogers, 1975). Fear appeals have been used in attempts to change

attitudes and behaviors on a wide variety of topics, including cigarette smoking, dental hygiene, tuberculosis, and the use of fallout shelters (see reviews by Higbee, 1969; Leventhal, 1970; Rogers, in press). Despite some inconsistencies among experimental findings, a positive relationship between fear arousal and persuasion has clearly been established. Three major theoretical explanations for the effects of fear appeal communications have been proposed: the drive-reduction model (Hovland, Janis, & Kelley, 1953; Janis, 1967), the parallel response model (Leventhal, 1970), and protection motivation theory (Rogers, 1975; in press). The drive-reduction and parallel response models have been criticized on both conceptual and empirical grounds. These criticisms have been outlined in other sources (e.g., Beck & Frankel, 1981; Rogers, 1975) and will not be repeated here. Throughout the development of fear appeal theories, researchers and theorists have become increasingly aware of the importance of the interaction of fear with other communication, communicator, and audience variables and of the role of cognitive mediational processes in persuasion and change. As theories have become more cognitive, they have more closely approximated an expectancy-value model.

Thus far, the most comprehensive theory of the effects of a fear appeal communication is protection motivation theory (Rogers, 1975; in press), a theory that stresses cognitive mediation rather than emotional arousal. According to Rogers (1975) the three primary stimuli in a fear appeal communication are (a) the magnitude of the noxiousness of the threatened event, (b) the probability of the event's occurrence, and (c) the effectiveness of a recommended preventive response. This information initiates corresponding cognitive appraisal processes concerning (1) the severity of the threatened event, (2) the probability or expectation that the event will occur, and

(3) the efficacy of the coping response. These cognitive processes mediate the persuasive effects of a fear appeal by arousing protection motivation, described by Rogers (1975) as "an intervening variable that has the typical characteristics of a motive: it arouses, sustains, and directs activity" (p. 98). Protection motivation theory stresses cognitive processes rather than emotional ones and emphasizes coping with or avoiding aversive events rather than reducing unpleasant emotional states.

Protection motivation theory is easily conceptualized as an expectancy-value theory. The noxiousness or appraised severity component is the value of the outcome, and both the probability of occurrence and coping response efficacy components are expectancies. Using Bandura's (1977) terminology, probability of occurrence and coping response efficacy can be viewed as outcome expectancies: the former, that persistence in some current behavior will lead to some undesirable event; the latter, that the performance of a recommended alternative behavior will avert the unpleasant or dangerous consequences. The shortcomings of traditional expectancy-value theory are apparent also in protection motivation--specifically, the lack of a self-efficacy component to take into consideration an individual's belief in his ability or lack of ability to perform the suggested alternative behavior. For example, a person may believe that adopting a recommended course of action (e.g., eliminating cigarette smoking) will avert some undesirable consequence (e.g., developing lung cancer). If the person, however, has serious doubts about his actual ability to carry out the recommendation (e.g., to quit smoking), then he is less likely to adopt that particular recommendation. Leventhal (1970) has raised this issue by differentiating coping ability into "ability, understanding, or readiness to execute specific protective actions

and...the perceived effectiveness of the particular remedies offered" (p. 151).

In a recent review of protection motivation research, Rogers (in press) has provided ample evidence for the importance of noxiousness or outcome severity, probability of occurrence, and coping response efficacy in influencing attitudes and intentions. That review also includes a revision of the theory that incorporates self-efficacy expectancy as a fourth component. Rogers (in press) cites Beck and Lund (in press) as providing correlational evidence for the importance of self-efficacy in predicting compliance with a recommended health-related preventive behavior in a fear appeals paradigm. That study, however, did not manipulate either self-efficacy expectancy or outcome expectancy. The present study is thus the first experimental investigation of the recent theory revision. Though protection motivation theory was proposed as an explanation of fear appeal communications, if the noxiousness component is seen as part of a "reinforcement value" continuum, if probability of occurrence and coping response efficacy are seen as outcome expectancies, and if a self-efficacy component is incorporated, then the resulting model may be applicable not only to fear appeals but also to other types of persuasive attempts. In a larger sense, protection motivation theory may serve as a model for examining the role of self-efficacy expectancy in expectancy-value explanations of behavior change. A general expectancy-value theory incorporating self-efficacy theory and protection motivation theory would consist of four components: (1) the outcome expectancy for a current behavior (probability of occurrence); (2) the outcome expectancy for a recommended alternative behavior (coping response efficacy); (3) the value of the consequences of persisting in the current behavior relative to the value

of the consequences of adopting the alternative behavior (equivalent to noxiousness or outcome severity); and (4) the self-efficacy expectancy for performing the alternative behavior.

Summary

The major purpose of the present experiment was to test the utility of a protection motivation theory that includes self-efficacy expectancy as a fourth component. This experiment was also designed to shed light on the role of self-efficacy expectancy in expectancy-value models of behavior and to enhance understanding of the relationship between self-efficacy expectancies and outcome expectancies. For the sake of greater clarity, the original protection motivation terms for the above four components are used in describing the methodology and results of this experiment. In the original formulation of protection motivation theory (Rogers, 1975) it was hypothesized that the components would combine multiplicatively. This combinatorial rule, however, has been consistently rejected (Rogers, in press). It was therefore predicted that main effects would occur for probability of occurrence, coping response efficacy, and self-efficacy expectancy on intentions to adopt the recommended preventive behavior (in this experiment, elimination or reduction of cigarette smoking). Because of the inconsistencies among the findings on the noxiousness/severity component, a main effect due to this variable was not predicted.

Method

Design and Subjects

The following variables were manipulated in a $2 \times 2 \times 2 \times 2$ factorial design: probability of occurrence of a specified aversive event (outcome expectancy-current behavior), the efficacy of a coping response in preventing

the aversive event (outcome expectancy-alternative behavior), noxiousness or outcome severity (value of the consequences of the alternative behavior relative to the current behavior), and self-efficacy expectancy for performing the coping response. One hundred fifty-three undergraduate students were exposed to combinations of these independent variables by reading written communications. Each experimental condition consisted of approximately equal numbers of male and female participants who were under 22 years of age and had been smoking at least an average of 10 cigarettes per day for the previous one-year period. At the time of recruitment, students were told that the study would be concerned with surveying the attitudes and opinions of cigarette smokers and with developing smoking-education materials for high school students.

Procedure

Subjects were run in groups ranging from six to twelve members and were assigned randomly to the experimental conditions through random distribution of the stimulus materials. The experiment was again described as a research project on cigarette smoking intended to help develop educational materials on cigarette smoking. Participants were further told that the educational materials were in the early stages of development and that the opinions and reactions of cigarette smokers were needed to assist in refining the materials. To facilitate confidentiality and honesty in responding, each subject was assigned an identification number to be placed on the questionnaire instead of his or her name. This identification number was also placed on an index card along with the subject's name, various demographic data, and data about smoking behavior (number of cigarettes smoked per day, number of years smoking). The introduction to the folders containing the communications contained a

brief description of the study and brief descriptions of the essays that were to follow. Subjects were instructed to read each essay carefully and to underline the most important phrase or sentence in each paragraph. This instruction was intended to insure closer attention to the material. Subjects were asked to proceed independently to the questionnaire upon finishing the essays and not to reread any of the essays once beginning the questionnaire. They were also asked not to return to earlier questionnaire items and change their responses. The debriefing that followed consisted of a full explanation of the true purpose of the experiment and correction of any erroneous information about cigarette smoking that may have been included in the essays, such as statements that smoking was unlikely to lead to lung cancer. Subjects were also given a fact sheet about smoking that again corrected erroneous statements made in the essays and that included a list of agencies to contact to obtain additional information on smoking and to seek assistance in quitting smoking.

Stimulus Materials

The written communications were designed to resemble "educational essays" on cigarette smoking and consisted primarily of citations of surveys and research studies (some factual, some fabricated) that supported the conclusion that cigarette smoking was either likely or unlikely to lead to lung cancer and heart disease (high versus low probability of occurrence); that cessation of smoking was likely or unlikely to eliminate or reduce risk for these conditions (high versus low coping response efficacy); that lung cancer and heart disease either are or are not seriously debilitating conditions (high versus low outcome severity); and that the reader would have either relatively little difficulty or relatively great difficulty reducing or

eliminating cigarette smoking (high versus low self-efficacy expectancy). The length of the essays ranged from 400 to 1200 words, although communications within a single independent variable were of approximately equal length.

Dependent Measures

The dependent measure of intentions to adopt the coping response consisted of four questionnaire items concerned with reducing or eliminating cigarette smoking (e.g., "At the present time, I intend to stop smoking completely.") Items included as checks on the success of the manipulations were designed to measure subjects' beliefs concerning the probability that they would develop health problems from smoking (e.g., "If I continue smoking, it is likely that I will develop lung cancer or heart disease in the years ahead."), the severity of these problems (e.g., "In spite of advances in modern medicine, lung cancer and heart disease remain as serious and dangerous as they were several years ago."), the probability of preventing these problems by eliminating cigarette smoking (e.g., "If I quit smoking, I will greatly increase my chances of living a longer life."), and their ability to quit smoking (e.g., "Quitting smoking would be very difficult and uncomfortable for me."). Subjects indicated agreement or disagreement with all questionnaire items by circling the appropriate number on a 14-point Likert response scale. Scores for all manipulation checks and the intentions measure were based on a mean rating for the items in each cluster. A number of other items were included as "filler" items to lend greater credibility to the cover story. Finally, a measure of fear arousal was included that consisted of six mood adjectives (fright, tension, nervousness, anxiety, discomfort, nausea) rated on a scale from 1 ("not at all") to 9 ("very much").

These items were averaged to yield a single score. These adjectives have been used previously in fear appeal research (e.g., Leventhal & Watts, 1966; Rogers & Mewborn, 1976; Rogers & Thistlethwaite, 1970).

Results

Manipulation Checks

Probability of occurrence. The analysis of variance revealed a main effect due to the Probability of Occurrence manipulation, $F(1,137) = 66.0$, $p < .001$. Subjects exposed to the high-probability essays indicated greater expectancies of developing the ill effects of smoking than subjects exposed to the low-probability essays ($M_s = 10.3$ and 7.4 , respectively). No other significant main effects or interactions were obtained.

Coping response efficacy. The analysis of variance disclosed a main effect due to the Coping Response Efficacy manipulation, $F(1,137) = 146.5$, $p < .001$. Subjects exposed to the high-efficacy essay indicated greater expectancies for avoiding the ill effects of smoking by quitting smoking than subjects in the low-efficacy condition ($M_s = 11.2$ and 5.8 , respectively). No other significant main effects or interactions were revealed.

Outcome severity. A main effect was revealed due to the Outcome Severity manipulation, $F(1,137) = 140.8$, $p < .001$. Subjects exposed to the high-severity essays rated the outcomes of smoking as more severe and dangerous than did subjects exposed to the low-severity essays ($M_s = 10.8$ and 5.9 , respectively). Two significant interaction effects were also found: Outcome Severity $\times$ Self-Efficacy, $F(1,137) = 4.14$, $p < .05$; Probability of Occurrence $\times$ Coping Response Efficacy $\times$ Outcome Severity, $F(1,137) = 7.4$, $p < .01$.

For the Outcome Severity $\times$ Self-Efficacy interaction, between-cell comparisons using the Duncan (1955) multiple range test ($p < .05$) revealed

that the effect of the high-versus the low-severity essay was significant under conditions of high self-efficacy ($M_s = 11.1$ and 5.4 , respectively) and low self-efficacy ($M_s = 10.4$ and 6.4 , respectively), though the effect was more pronounced under the former than the latter. Between-cell comparisons in the three-way interaction revealed an interaction between Probability of Occurrence and Coping Response Efficacy in the high-severity condition only. The high response efficacy essay produced greater perceptions of outcome severity than the low response efficacy essay under the low Probability of Occurrence condition ($M_s = 11.5$ and 9.7 , respectively) but not under the high Probability of Occurrence condition ($M_s = 10.5$ and 11.4 , respectively). Under the low-severity condition, no significant between-cell comparisons were found.

Self-efficacy expectancy. A main effect was revealed due to the Self-Efficacy manipulation, $F(1,137) = 38.96$, $p < .001$. Subjects who read the high self-efficacy communication indicated greater expectations concerning their ability to give up smoking than did subjects exposed to the low self-efficacy communication ($M_s = 9.2$ and 6.7 , respectively). No other significant main effects were found. In addition, a significant interaction effect was found for Self-Efficacy x Coping Response Efficacy $F(1,137) = 8.75$, $p < .01$. Between-cell comparisons using the Duncan multiple range test ($p < .05$) revealed that the effect of the high self-efficacy essay versus the low self-efficacy essay was significant under conditions of low response efficacy ($M_s = 9.5$ and 5.9 respectively) and high response efficacy ($M_s = 8.9$ and 7.6 , respectively) but was more pronounced under the former condition than the latter.

Fear. The analysis of variance on the sum of the six fear items revealed

only a marginally significant effect due to the Outcome Severity manipulation, $F(1,137) = 3.8$, $p = .053$. The high severity essay tended to produce greater feelings of fear ($M = 4.0$) than the low severity essay ($M = 3.5$). No other significant main effects or interactions were found.

Intentions

The analysis of variance revealed main effects on intentions to stop smoking due to two independent variables: Coping Response Efficacy $F(1,137) = 4.65$, $p < .05$; and Self-Efficacy Expectancy, $F(1,137) = 10.01$, $p < .01$. Subjects exposed to the high coping response efficacy essay indicated greater intentions to adopt the recommendation that did subjects in the low coping response efficacy condition ($M_s = 8.0$ and 6.9 , respectively). The high self-efficacy essay also resulted in stronger intentions to quit smoking than did the low self-efficacy essay ($M_s = 8.2$ and 6.7). In addition, a marginally significant effect was revealed due to the probability of occurrence manipulation, $F(1,137) = 3.87$, $p < .051$, with the high probability essay resulting in stronger intentions than the low probability essay ($M_s = 8.0$ and 7.0 , respectively).

In addition to these main effects, two significant interaction effects were found: Coping Response Efficacy x Self-Efficacy, $F(1,137) = 4.54$, $p < .05$; and Probability of Occurrence x Coping Response Efficacy x Self-Efficacy, $F(1,137) = 6.23$, $p < .02$. Between-cell comparisons for the two-way interaction using the Duncan multiple range test ($p < .05$) revealed that the effect of the high versus the low self-efficacy essay was significant under conditions of low response efficacy ($M_s = 8.2$ and 5.7 , respectively) but not under high response efficacy ($M_s = 8.3$ and 7.7 , respectively). Likewise, the high response efficacy essay was more effective than the low re-

sponse efficacy essay under the low self-efficacy conditions ($M_s = 7.7$ and 5.7 , respectively) but not under the high self-efficacy condition ($M_s = 8.3$ and 8.2 , respectively).

Insert Table 1 about here

This interaction, in turn, must be interpreted in light of the triple-order interaction (see Table 1). The Probability of Occurrence x Coping Response Efficacy interaction was tested at each level of Self-Efficacy. These analyses revealed that the second-order interaction effect attained significance only in the high self-efficacy condition, $F(1, 71) = 6.64$, $p < .02$. In the low self-efficacy condition, a significant main effect due to Coping Response Efficacy was revealed $F(1, 74) = 8.57$, $p < .01$; the interaction was not significant, $F(1, 74) = 1.33$, $p = .25$. Table 1 displays the obtained means for these effects. An examination of the means obtained in the high self-efficacy condition via the Duncan multiple range test revealed that the interaction was due to the increase from low-to-high probability of occurrence in the low coping response efficacy condition.

An inspection of these results sheds light on how people combine the three informational components. These results were not consistent with a multiplicative rule (as originally proposed in protection motivation theory) nor with an additive rule. The interaction effect indicates that the combinatorial rule was subadditive. A high level of any two of these three independent variables was sufficient to produce the highest intention scores obtained in this study. These data reveal a threshold effect, beyond which additional information did not affect intentions. A Scheffe comparison

disclosed that the four treatment combinations containing at least two high levels of the independent variables produced higher intention scores ($p < .05$) than the four treatment combinations containing at least two low levels of the independent variables. In addition, none of the four highest points differed significantly from any of the others, nor were there any significant differences among the four lowest points. The interaction effect is subadditive because the treatment combination that had high levels of all three independent variables did not exceed those that had high levels of only two of the three variables.

A multiple regression analysis between the four manipulation checks and intentions resulted in a Multiple $R = .55$ ($p < .001$). Individual correlations with intentions were: probability of occurrence, .25 ($p < .01$); coping response efficacy, .17 ($p < .05$), outcome severity, .17 ($p < .05$); self-efficacy, .48 ($p < .001$).

Discussion

Protection Motivation Theory

Consistent with previous research (e.g., Janis & Mann, 1965; Kleinot & Rogers, in press; Leventhal & Watts, 1966; Rogers, in press; Rogers & Mewborn, 1976; Rogers & Thistlethwaite, 1970; Shelton & Rogers, in press; Stainback & Rogers, in press), the present experiment provided evidence for the importance of the probability of an event's occurrence (outcome expectancy for the current behavior) and the efficacy of the recommended coping response (outcome expectancy for the alternative behavior) in determining intentions to perform the recommended behavior. More importantly, however, the present findings provide strong support for the importance of self-efficacy expectancy as a fourth component of protection motivation theory (Rogers, in press).

Not only did self-efficacy expectancy significantly influence intentions to adopt the recommended coping behavior, but self-efficacy expectancy proved to be, by far, the most powerful predictor of behavioral intentions. In addition, expectations of self-efficacy influenced the effect of two other major components of protection motivation theory: probability of occurrence and coping response efficacy.

Previous research (e.g., Kleinot & Rogers, in press; Rogers & Mewborn, 1976) found an interaction between probability of occurrence and coping response efficacy on intentions to adopt the recommended coping behavior. Two of these studies (Kleinot & Rogers, in press; Rogers & Mewborn, 1976) found that increments in probability of occurrence resulted in higher behavioral intention scores only when the coping response was considered effective in preventing the threatened aversive outcome. If the recommended behavior was believed to be relatively ineffective (low coping response efficacy, or low outcome expectancy), then higher levels of probability of occurrence (or outcome expectancy for the current behavior) tended to produce lower behavioral intention scores. The results of the present study, however, revealed that the effects of probability of occurrence (outcome expectancy-current) and coping response efficacy (outcome expectancy-alternative) on behavioral intentions was dependent on the strength of self-efficacy expectancies. Under low self-efficacy, a main effect was revealed due to coping response efficacy, with no main effect for probability of occurrence. Thus, when persons believed themselves relatively incapable of performing the recommendation, their behavioral intentions were influenced only by their belief in the effectiveness of the recommendation. When self-efficacy was high--when participants believed that the recommended behavior would be

relatively easy to perform and that they were relatively capable of doing so--a very different pattern emerged; under high self-efficacy, a high level of probability of occurrence (outcome expectancy-current) tended to produce higher intention scores only if the coping response was perceived as relatively ineffective. Thus, it appears that the influence of probability of occurrence (outcome expectancy-current) and coping response efficacy (outcome expectancy-alternative) may depend largely on an individual's self-efficacy expectancy--his perception of his ability to perform the recommended coping response--with very different patterns of influence emerging with different levels of self-efficacy expectancy.

The effect of self-efficacy expectancy on intentions may occur in two ways. First, self-efficacy expectancy alone may directly produce modifications in behavioral intentions, as evidenced by the extent to which, in the present study, the intentions of cigarette smokers to reduce smoking were influenced by the smoker's beliefs in their ability to change this behavior. Second, self-efficacy may influence the effects of the other components, probability of occurrence and coping response efficacy, as evidenced by the different interaction effects between these variables at different levels of self-efficacy expectancy.

An examination of the second avenue of influence as it occurred in this experiment results in some interesting implications for the revised version of protection motivation theory, particularly for the notion of "coping appraisal" (Rogers, in press). In the present study, a high level of probability of occurrence tended to produce stronger intentions to adopt the recommended behavior under two sets of conditions: (1) if people believed the behavior would be difficult to perform but relatively effective in pre-

venting the aversive outcome and (2) if they believed the behavior would be relatively easy to perform but relatively ineffective. Increments in probability of occurrence did not lead to higher intention scores under two other sets of conditions: (1) if people believed the behavior would be both difficult to perform and relatively ineffective and (2) if they believed the behavior would be both easy and effective. A conclusion that may be drawn from this pattern is that the effect of probability of occurrence on intentions to change behavior may depend on the person's perception that he can successfully cope with the impending danger. This "coping appraisal" can be viewed as a product of the person's self-efficacy expectancy and outcome expectancy (coping response efficacy) for the recommended behavior (Rogers, in press). If coping appraisal is very low (low self-efficacy and low coping response efficacy), then a person may be convinced of the uselessness in attempting the recommended coping response; as a result, probability of occurrence or perceptions of vulnerability will have little if any effect on intentions to attempt the behavior. At the other extreme, when coping appraisal is very high (high self-efficacy and high coping response efficacy), then the individual may be highly motivated to attempt the behavior regardless of perceived vulnerability or probability of occurrence. As a result, increments in probability of occurrence will have a minimal effect on intentions. At more moderate levels of coping appraisal, however, (when self-efficacy is high and response efficacy low, or vice versa, or when both are at moderate levels), a person's perception of his vulnerability to the threat (probability of occurrence) may have a stronger effect on intentions to adopt the recommendation. Thus, the influence of self-efficacy may be mediated by changes in coping appraisal, changes directly affected by changes in self-

efficacy expectancy.

The original three-component protection motivation theory (Rogers, 1975) hypothesized that the components would combine in a multiplicative rather than addition manner to produce changes in attitudes and intentions. Subsequent research, however, has not supported the multiplicative hypothesis, and an additive process has instead been proposed (Rogers, in press). The results of the present experiment not only offer additional evidence to affirm the multiplicative combinatorial rule, but also suggest that the additive or algebraic rule may apply only up to a point. The Probability of Occurrence x Coping Response Efficacy x Self-Efficacy interaction is inconsistent with a strictly additive model. Contrary to the predictions of a additive model, the combination of high levels of these three variables did not produce the highest intention scores, nor did the combination of three low levels produce the lowest intention scores. As described earlier, if a high level of any two of these three independent variables was present, then a threshold was reached beyond which additional information did not have a significant effect. Likewise, combinations of any two low levels of the three components were sufficient to produce the minimum behavioral intention scores, in effect negating the influence of the remaining "high" component. Thus, these variables combined in a "subadditive" manner.

In addition to the "coping appraisal" explanation described above, at least two other post hoc interpretations of these findings are possible. First, the results may be indicative of a threshold in the amount of information or data the subjects were willing or able to attend to process, or utilize in making decisions--a threshold that consequently limited the extent to which they altered their beliefs and intentions. This interpretation is

informed by the manipulation checks that revealed that information about all the components was attended to and assimilated. Therefore, something occurred after the information was processed and before a decision was made about intending to adopt the recommended behavior. Two processes seem likely. First, if any one of the three variables was at a low level (e.g. low probability of occurrence), then the threshold was reached if both of the other two variables were at a high level (high coping response efficacy and high self-efficacy). Thus, if people did not believe they would be exposed to the danger (low probability of occurrence), then their intentions to adopt the recommended behavior were higher if they believed (a) they could perform the coping response (high self-efficacy) and (b) the coping response was highly effective. Despite their relatively low expectations of being exposed to the danger, they were persuaded by the relatively high expectations of the response's effectiveness and their own chances for successful performance. Individuals seemed to be thinking "Why take a chance?" and thus followed a precaution strategy or heuristic rather than a strictly "rational" strategy. As Publilius observed, "He is safe from danger who is on guard even when safe." Second, if one of the three variables was high (e.g., high probability of occurrence), then this threshold was reached if either of the other two variables was at a high level (high coping response efficacy or high self-efficacy). Thus, if people believed they would be exposed to danger (high probability of occurrence), then their intentions were stronger if they believed either (a) they could perform the coping response (despite low expectations of its effectiveness) or (b) the coping response could effectively avert the danger (despite low expectations of their ability to perform the response). Because of their high expectations of being exposed to the danger, they were

more easily persuaded by any information that offered the possibility of avoidance. Confronted with a rather desperate situation, individuals seemed to be thinking "I have nothing to lose and much to gain" and thus adopted a "hyperdefensiveness" strategy that may be directed as much toward reducing anxiety as avoiding danger (e.g. similar to Leventhal's, 1970, distinction between fear control and danger control). This hyperdefensive posture may be the individual's final defensive effort before assuming a posture of resignation and helplessness.

These two strategies, a precaution strategy and a hyperdefensiveness strategy, produced subadditive effects that may account for the absence of multiplicative interaction effects as found in previous studies (e.g., Rogers & Mewborn, 1976). The discussion of these strategies began by first considering whether or not individuals believed that they would be exposed to the depicted danger. These same strategies can be observed, however, by considering first either coping response efficacy (outcome expectancy) or self-efficacy expectancy. For example, if individuals believe they cannot perform the coping response (low self-efficacy), then their intentions are higher if they believe that they will be exposed to the danger, regardless of the effectiveness of the coping response. Thus, individuals are following the hyperdefensiveness strategy.

Although these two strategies producing the interaction effect are not "rational" in the sense of traditional decision theories, they operate to ensure the individual's safety. When confronted with a threat, people choose to adopt the recommended coping response although from a strictly logical perspective, (a) the response is not really necessary (the precaution strategy), and (b) the danger cannot be avoided (the hyperdefensiveness strategy).

Self-Efficacy Theory

The present study provides additional evidence that verbal persuasion can be an effective method for altering beliefs about self-efficacy. Maddux et al. (in press) found that verbal persuasion could successfully modify self-efficacy expectations concerning a specific assertive behavior. The present study found the same effect for a very different behavior, cigarette smoking, suggesting that the effect may be a general one. In addition, it was found that self-efficacy expectancies created via verbal persuasion can have significant impact on intentions to engage in certain behaviors. Bandura (1977) has suggested that verbal persuasion is a less potent source of information than performance accomplishment, vicarious experience, or emotional arousal. Bonfilio (Note), however, found that performance experience was not superior to verbal persuasion in altering self-efficacy expectancies for a relaxation technique. Those findings, the results of Maddux et al. (in press), and the present findings strongly suggest that verbal persuasion is a more powerful source of self-efficacy beliefs than was originally believed. This is a particularly compelling proposal in light of the fact that Bonfilio (Note) Maddux et al. (in press), and the present study influenced self-efficacy beliefs following a single exposure to a brief, written communication. Repeated exposure to lengthier persuasive communications transmitted through more powerful channels (e.g., television) would likely produce more durable and persistent beliefs about self-efficacy.

Previous research on self-efficacy (Bandura & Adams, 1977; Bandura et al., 1977; Bandura, et al, 1980; Beck & Lund, in press; Fleming & Thornton, 1980; Keyser & Barling, 1981; Zeiss, Lewinsohn, & Munoz, 1979) has used correlational methods to examine the role of self-efficacy as

a cognitive mediator in processes of behavior change. These studies have generally offered evidence for a positive relationship between self-efficacy expectancy and successful behavior change. The strong correlation between self-efficacy expectancy and behavioral intentions found in the present experiment is consistent with these previous studies. In addition, the present results provide evidence for self-efficacy as a causal factor in behavior change since direct manipulations of self-efficacy expectancies produced corresponding changes in behavioral intentions rather than merely being correlated with behavior change.

Additional evidence was also provided for the reciprocal influence of self-efficacy expectancy and outcome expectancy, a finding that is inconsistent with Bandura's hypothesis that these two expectancies are independent. Maddux et al. (in press) found a main effect for outcome expectancy on a measure of self-efficacy, with high outcome expectancy producing greater self-efficacy than low outcome expectancy. Persons who believed the behavior would result in a highly desirable outcome indicated stronger perceptions of their ability to perform the behavior in question. That study also found an interaction between outcome expectancy and self-efficacy such that self-efficacy information was more effective under low outcome expectancy than under high outcome expectancy. Although the present experiment did not produce a similar main effect, the interaction effect found in Maddux et al. (in press) was replicated. In both studies, persons believing that a relatively weak relationship existed between the behavior and the outcome were more easily persuaded by information about their self-efficacy than were persons perceiving a strong relationship between behavior and outcome. Thus outcome expectancy may have two avenues of influence on behavior change: by

directly causing changes in intentions and behavior and by causing changes in self-efficacy that subsequently influence behavior. Perhaps if the behavior-outcome relationship is believed to be weak, then the behavior becomes less salient or important to the individual, thus making the person more vulnerable to persuasive attempts aimed at other beliefs concerning that behavior, such as self-efficacy expectancies.

The success of the written communications in altering beliefs about self-efficacy and the demonstrated causal relationships between changes in self-efficacy expectancy and behavioral intentions has important practical as well as theoretical implications. Persons undergoing psychological treatment, for example, may fail to attempt new and threatening behaviors because they believe themselves incapable of performing the behaviors correctly. Such beliefs may be successfully counteracted by providing "information" in oral or written form designed to enhance the individual's beliefs about his self-efficacy and about his expectations for success. This may be a more efficient method than arranging for a successful behavioral experience or a vicarious (modeling) experience to increase the expectations of success that facilitate additional, more significant behavioral changes.

In addition, mass media campaigns regarding health practices, conservation efforts, and other socially significant behaviors might do well to emphasize the individual's ability to perform suggested or recommended behaviors--self-efficacy expectancies--rather than focusing exclusively on the dangers or benefits of alternative behaviors (i.e., outcome expectancies, reinforcement value). This recommendation was made by Beck and Frankel (1981) in their review of theories of attitude change and health behavior. The present experiment provides empirical support for that recommendation. In

his early work on fear appeal communications, Leventhal (1970) proposed that an individual must possess the ability to make a coping response, in addition to believing that the response will be effective. Leventhal found that offering "specific action instructions" increased adoption of the recommended behavior. More recently, Leventhal and Cleary (1980) have proposed that "action plans" are necessary for behavior change and report research with cigarette smokers in support of this hypothesis. Both "specific action instructions" and "action plans" may be viewed as means for enhancing self-efficacy expectancy. The results of this study suggest that beliefs about self-efficacy should be, perhaps, the major target of any persuasive attempt whether in the mass media or in psychotherapy (a process that consists largely of verbal persuasion). The power of the self-efficacy manipulation in the present study provides support for the proposal that measures of self-efficacy should be used as outcome measures in psychotherapy (Alden, Safran, & Weideman, 1978; Condiotte & Lichtenstein, 1981; Hammen, Jacobs, Mayol, & Cochran, 1980; Kazdin, 1979; Kendall & Korgeski, 1979).

Toward a General Expectancy-Value Model of Attitude Change

The recent revision of protection motivation theory (Rogers, in press) includes a proposal of six conditions that are prerequisite to eliciting protection motivation and adoption of the recommended coping behavior: (1) the threat is perceived as severe, (2) the individual perceives himself as vulnerable to the threat, (3) the person believes he is capable of performing the response, (4) the coping response is believed to be effective, (5) the rewards associate with the maladaptive response are outweighed by the value of avoiding the threat, and (6) the costs of the adaptive response are outweighed by its perceived benefits. If components (1), (5), and (6) are

viewed as a single factor concerned with the value (rewards and costs) of continuing to engage in the current behavior relative to adopting the new behavior, then the four components that emerge are: (1) outcome expectancy for the current behavior, (2) outcome expectancy for the alternative behavior, (3) self-efficacy expectancy for the alternative behavior, and (4) the relative value of the different sets of outcomes. This model is proposed as a more general expectancy-value model of persuasion and behavior change not limited in application to fear appeal communications. Results of this and earlier fear appeal studies provide evidence for the importance of components (1), (2), and (4). The overwhelming importance of self-efficacy expectancy is demonstrated by the results of the present experiment. Changes in self-efficacy expectancy not only produced changes in behavioral intentions, but expectancies of self-efficacy proved to be the superior predictor of behavioral intentions (as previously demonstrated by the work of Bandura and his associates and by Beck & Lund, in press; Condiotte & Lichtenstein, 1981). It may be concluded, therefore, that the model of fear appeals and persuasion proposed by Rogers (1975) and the revised version (Rogers, in press) including self-efficacy expectancy is not only a useful model for understanding the effects of fear appeals on persuasion, but if defined and operationalized in broader terms, may be useful as a general expectancy-value model of attitude and behavior change. The present experiment examined one of the most simple behavior changes that the model would accommodate: a change from performing a given behavior to not performing that behavior. The factors to be considered become more numerous as the proposed behavior changes become more complex (for example when one must choose between two or more alternative behaviors) yet the information the individual uses to make his or

her decision can be categorized as either an outcome expectancy for one or more of the behaviors under consideration, a self-efficacy expectancy, or information about rewards and costs (i.e., value). By focusing on fear appeal communications, protection motivation theory is limited by its emphasis on negative events, aversive outcomes, and the "punishment" end of the reinforcement value continuum. A shift in emphasis, however, to descriptions of positive outcomes and the "pleasure" end of the reinforcement value continuum would require little if any modification of the basic components of the theory while greatly increasing its range of applicability. Such a shift in emphasis offers numerous research possibilities and opportunities for theoretical investigation.

Most empirical investigations of expectancy-value theories, as well as the majority of the important theoretical statements, have been performed in the areas of social and industrial/organizational psychology. Until recently, the importance of self-efficacy has been all but ignored. Within the past several years, self-efficacy has emerged as an important concept in clinical psychology. While its usefulness in explaining therapeutic behavior change procedures has been demonstrated, empirical investigations of self-efficacy have been largely correlational rather than experimental, and theoretical relationships to expectancy-value theories in other fields of psychology have been virtually unexplored. Incorporating self-efficacy expectancy into expectancy-value theories can not only provide opportunities for advances in research and theory in the separate fields of clinical and social psychology but also for the "bridging" of two important areas of study that are both concerned with explaining and predicting human behavior.

Reference Note

1. Bonfilio, S.A. The effects of persuasion, performance, and outcome on self-efficacy and intentions to adopt a health care behavior. Unpublished doctoral dissertation. University of Alabama, 1981.

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TABLE I

Mean Scores of Three-way Interaction Effect of Probability of Occurrence, Coping Response Efficacy, and Self-Efficacy Expectancy on Intentions to Adopt the Coping Response.

Experimental condition	Self-Efficacy	
	High	Low
High Probability of Occurrence		
High Coping Response Efficacy	<i>8.1_{ce}</i>	<i>8.5_{ce}</i>
Low Coping Response Efficacy	9.7 _{ac}	5.6 _{bd}
Low Probability of Occurrence		
High Coping Response Efficacy	<i>8.4_{ce}</i>	7.0 _{bc}
Low Coping Response Efficacy	6.9 _{bc}	5.8 _{bd}

Note: Means that do not share a common subscript differ significantly ($p < .05$). Means in italics represent treatment combinations that contain at least two high levels of the independent variables and differ significantly from the remaining means ($p < .05$) though not from each other.